WAFER CHUCKS ALLOWING CONTROLLED REDUCTION OF SUBSTRATE HEATING AND RAPID SUBSTRATE EXCHANGE

Abstract of the Disclosure

Substrate-holding devices ("wafer chucks") and methods are disclosed for use in any of various apparatus and methods for processing a substrate. For example, the wafer chucks are especially useful with microlithography apparatus and methods, especially such apparatus and methods employing a charged particle beam. The devices and methods achieve controlled reduction of substrate heating and rapid substrate exchange during substrate processing. The wafer chuck has an adhesion surface and a heat-transfer-gas (HTG) channel. In an exemplary configuration, the HTG channel is connected to an HTG supply and a gas-evacuation system. Heat-transfer gas is caused to flow through the channel during a predetermined time period when the substrate is being held (typically by electrostatic force) on the adhesion surface. At a first time instant, execution of the fabrication process on the substrate (adhered to the adhesion surface) is commenced. At a second time instant relative to the fabrication process, the heat-transfer gas is evacuated from the channel. These time instants can be established to allow wafer-exchange to be performed quickly.